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Short running head title: Benefits of Attaining the 8-hour Ozone Standard

Key Words: air pollution, ozone, health impact assessment, standards, benefit analysis

Abbreviations:

AHRQ: Agency for Healthcare Research and Quality
AQS: Air Quality System
BenMAP: Environmental Benefits Mapping and Analysis Program
CAPMS: Criteria Air Pollutant Modeling System
CDC: Centers for Disease Control
CDC WONDER: Centers for Disease Control Wide-Ranging Online Data for Epidemiological Research
CI: Confidence interval
COI: Cost of illness
COPD: Chronic obstructive pulmonary disease
CPI-U: Consumer price index – urban
EPA: Environmental Protection Agency
ER: Emergency room
HIS: National Health Interview Survey
ICD: International Classification of Disease
MRAD: Minor restricted activity days
NCHS: National Center for Health Statistics
NHDS: National Hospital Discharge Survey
NHAMCS: National Hospital Ambulatory Medical Care Survey
NMMAPS: National Morbidity, Mortality and Air Pollution Study
NOx: Nitrogen oxides
PM_{10}: Particulate matter less than or equal to 10 microns
$PM_{2.5}$: Particulate matter less than or equal to 2.5 microns
ppb: parts per billion
POC: Parameter occurrence code
RIA: Regulatory impact analysis
SO_2: Sulfur dioxide
U.S.: United States
VOC: Volatile organic compounds
VNA: Voronoi neighbor averaging
VSL: Value of statistical life
WHO: World Health Organization
WTP: Willingness to pay

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I. Abstract:

During the 2000-2002 time period, between 36 and 56 percent of ozone monitors each year in the U.S. failed to meet the current ozone standard of 80 ppb for the 4th highest maximum 8-hour ozone concentration. We estimated the health benefits of attaining the ozone standard at these monitors using the Environmental Protection Agency's Environmental Benefits Modeling and Analysis Program (BenMAP). We used health impact functions based on published epidemiological studies, and valuation functions derived from the economics literature. The estimated health benefits for 2000 and 2001 are similar in magnitude, while the results for 2002 are roughly twice that of each of the prior two years. The simple average of health impacts across the three years includes reductions of 800 premature deaths, 4,500 hospital and emergency room admissions, 900,000 school absences, and over a million minor restricted activity days. The simple average of benefits (including premature mortality) across the three years is $5.7 billion (90% CI: 0.6, 15.0) for the quadratic rollback simulation method and $4.9 billion (90% CI: 0.5, 14.0) for the proportional rollback simulation method. Results are sensitive to the form of the standard and to assumptions about background ozone levels. If the form of the standard is based on the 1st highest maximum 8-hour concentration, impacts are increased by a factor of two to three. Increasing the assumed hourly background from zero to 40 ppb reduced impacts by 30 and 60 percent for the proportional and quadratic attainment simulation methods, respectively.